OP. 3100.5-296

MINISTRY OF EDUCATION

National Advisory Council
on the Training and Supply of Teachers

Teachers for Further Education

Report of an Advisory Sub-committee

LONDON
HER MAJESTY'S STATIONERY OFFICE
1961
PRICE 1*s*. 3*d*. NET

National Advisory Council on the Training and Supply of Teachers
Advisory Sub-committee on Teachers required in Establishments of Further Education

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The estimated cost of the preparation of this report is £244 of which £155 represents the estimated cost of printing and publishing the report.

Letter from the Chairman of the National Advisory Council on the Training and Supply of Teachers forwarding the report to the Minister of Education.

University College of Sussex
24th May, 1961

Dear Minister,

As Chairman of the National Advisory Council on the Training and Supply of Teachers, I have pleasure in forwarding to you the attached report on the future need for teachers in establishments of further education. In approving this report, the Council warmly endorsed the view of the Standing Committee on Teachers for Further Education that it should be published as soon as possible.

Yours sincerely,

JOHN FULTON

The Rt. Hon. Sir David Eccles, K.C.V.O., M.P.,
Ministry of Education,
Curzon Street,
London, W. 1.

Foreword

by Sir Willis Jackson, F.R.S., Chairman of Standing Committee C

Towards the end of 1959 it was decided by Standing Committee C of the National Advisory Council on the Training and Supply of Teachers to set up a sub-committee to consider the future requirements for teachers in further education. The estimates drawn up by the Special Committee, whose report *The Supply and Training of Teachers for Technical Colleges* was published in 1957, extended only as far as the session 1960–61, and it was evident that new forecasts of future needs would be valuable.

Under the chairmanship of Mr. E. L. Russell, C.B.E., M.A., the Sub-committee have now completed their report. They estimate that it will be necessary to double the force of full-time teachers in further education in the next ten years. This estimate is based on current policy and trends alone and makes no allowance for new developments.

I should like to express the Standing Committee's appreciation of the help received from the colleges, since we undoubtedly caused them a great deal of work. The Chairman of the Sub-committee has also informed me how indebted he and his colleagues are for the unfailing help and advice of the officers of the Ministry who attended the Sub-committee's meetings. It gives me great pleasure to endorse most warmly these expressions of thanks.

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Sub-Committee on future estimates of teachers required in establishments of further education

REPORT

INTRODUCTION

1. We were set up to advise on future estimates of teachers required in further education, and it was suggested that we might consider whether estimates could be carried into the late 1960s in order to measure the effect of projected college expansion and the consequences of the "bulge" years. We were also invited to enquire into the character of the shortages in certain subjects.

2. We were very conscious throughout that any calculations of our own would have a considerable margin of error and were bound to be expressed in broad terms. If we were to provide estimates of present shortages and future needs in particular subjects and for different levels of work we would have to rely on forecasts made by the colleges. It would have been unreasonable to ask individual colleges for estimates relating to the second half of the decade, but information about their needs over the next few years would be valuable, both to provide a picture with some detail and also to enable our calculations of the long term need to start from a firmer base.

The enquiry to colleges

3. We asked colleges for the number of full-time staff employed at 31st March, 1960, divided by subjects and grade of post. We also asked for their authorised establishment at that date. Since at the end of March the number of newly created posts was near its minimum, the difference between actual and authorised numbers would, we felt, be a useful starting point in measuring staff shortage at the present time; to supplement this statistical picture we invited college authorities to comment on any deficiencies in staffing, whether in numbers or quality. We then asked the colleges for their estimates of the number of full-time teachers required in the same categories in the 1961–62 and 1963–64 sessions. We felt that the figures given for the former year should be reasonably firm, and we were prepared to treat the later figures with rather more caution, bearing in mind the difficulties in looking four years ahead.

4. Since art education was currently under review, art establishments only completed the form in respect of subjects such as architecture and printing. On agricultural education, the Report of the Committee under Alderman Lampard-Vachell was still awaited, and we therefore also excluded Farm Institutes. We also decided to omit Evening Institutes from the return, since they are staffed almost wholly by part-time teachers. In these matters we followed the precedent of the 1957 Report of the Special Committee.*

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* *The Supply and Training of Teachers for Technical Colleges* (H.M.S.O., 1957, price 5s.).

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5. We decided to confine the main return to full-time staff. The Report of the Special Committee in 1957 made clear the large contribution which part-time staff make to the staffing of the colleges. We were sure, however, that (apart from the special difficulty of securing adequately qualified part-time staff in the day time) the future recruitment problem would be mainly one of securing full-time staff. We therefore contented ourselves with asking colleges for the overall proportion of work carried out by the full-time staff returned for March, 1960 and the proportion assumed in the estimates which they made for future years; by this means we were able to get a rough measure of the contribution of part-time staff.

6. Our questionnaire was divided into twenty-six separate subjects of instruction, and colleges were asked to include staff under the heading appropriate to their subject of teaching, irrespective of the department to which they belonged. Thus the return of teachers of mathematics includes teachers who are teaching that subject to engineering students. Within each subject we divided staff into four groups. We had separate headings for Heads of Departments and for Readers, and grouped the remaining grades into two categories, the first covering Principal Lecturers, Senior Lecturers, and Lecturers, who will be mainly concerned with the more advanced work, and the second covering Assistants Grade A and B, who will be mainly concerned with the less advanced work.

7. We are most gratified that every college replied to our enquiry, and we take this opportunity of thanking them for carrying out this complex task. The estimates received are tabulated in Tables IV and V of Appendix A. The first of these tables relates to existing Colleges of Advanced Technology and the other colleges which we are advised may, through designation, fall into this category by 1963–64. The second table relates to all other colleges. In Tables I–III of Appendix A we summarise the essential information which the college returns convey.

THE PRESENT STAFFING SITUATION

8. The total number of full-time staff in the establishments and departments covered by the enquiry was 17,916 at 31st March, 1960 (see Table I). We estimate that this represents a net increase of about 1,880 on the previous year. The Special Committee in its 1957 Report set the target of increasing the number of teachers in these establishments by 1,430 in each of the years from 1955–61. This target was first passed in the year 1957–58, and it is evident that the force of full-time staff is continuing to rise by larger numbers and indeed at an increasing rate. There is little doubt that by March, 1961, the colleges will have passed the target of 18,600 full-time teachers set for that date.

9. The Special Committee also made separate estimates of the need for qualified scientists and technologists. Larger numbers have been recruited each year in these categories also. The target for graduates in mathematics and science set by the Special Committee was about 3,400 for 1960–61. This total has already been reached. The target of "graduate technologists" set for 1960–61 by the Special Committee was 2,600.* This estimate, however, presupposed a "radical departure" from the pattern of qualifications at the time, since the Committee considered that the proportion of work carried out by university graduates needed to be greatly increased. The total of teachers holding university degrees in technological subjects is, in the event, not likely much to exceed 2,000 by 1960–61.

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* The term "graduate technologist" was there used to denote teachers holding university degrees or Diplomas in Technology in technological subjects.

10. The college returns disclose as many as 1,016 vacancies for full-time staff at 31st March, 1960 (see Table I). Even though the college returns relate to March, a fair proportion of casual vacancies is necessarily included in them. Nevertheless, the comments we received from colleges and local education authorities told of difficulties in securing teachers of the right quality in many fields. Shortage of staff is particularly noticeable in the senior grades of post. Eight and a half per cent more Lecturers, Senior and Principal Lecturers were needed in March, 1960, compared with 5·6 per cent in all grades. Present difficulties in securing senior staff are well brought out in Table II. This relates only to colleges which are or may be designated as Colleges of Advanced Technology. These colleges in March required 13·8 per cent more staff to fill their authorised establishments. The most conspicuous group of vacancies was in the Reader grade where only forty-one posts out of eighty were filled.

11. The various subjects of teaching show difficulties to different degrees, as will be seen from columns (2) and (3) of Table III. The greatest numerical shortages are in mechanical engineering and in electrical engineering. But whereas in mechanical engineering the proportion of vacancies is the same as the average for all subjects, the proportion of vacancies in electrical engineering is higher than the average. The subject with the highest proportion of vacancies is management studies.

12. There must be two principal factors responsible for the present situation, when targets set in 1957 have been reached but shortages remain. In the first place, new demands which colleges could not have foreseen will undoubtedly have arisen in the interval. Secondly, the targets set by the Special Committee were based on the assumption that the average number of hours taught by individual teachers remained constant. But the report strongly advocated some reduction, and our own experience suggests that college authorities have in fact made strenuous efforts to reduce the teaching load on staff during the past few years.

THE NEED FOR FULL-TIME STAFF UP TO 1963–64

(A) THE COLLEGE ESTIMATES FOR 1963–64

13. According to the college estimates, the overall increase in teaching strength desired by 1963–64 is 40 per cent (line 8 of Table I). This represents an average rise of 10 per cent per annum on present numbers, and is identical with the 50 per cent over five years first noted by the Special Committee. These figures relate to full-time and part-time staff together. For full-time staff alone an increase of 52 per cent is required in the four years. The total number of full-time staff desired in 1963–64 is 27,235.

14. It will be noted from line 9 of Table I that the colleges assume an increase over the period in the proportion of work undertaken by full-time staff from 64 to 69 per cent. The questionnaire completed by the colleges in 1956 for the Special Committee disclosed that the proportion was then already about 65 per cent and, from the forecasts made at that time, we could have expected the present proportion to be higher than 64 per cent. We are strongly in favour of the increase in the proportion which the colleges now put forward as desirable, for the same reasons as those advanced in paragraphs 44 and 45 of the Special Committee's Report, and we accept that the aim should be to increase the proportion of work carried out by full-time staff to 69 per cent in 1963–64. The proportion of work carried out by full-time staff is higher at Colleges of Advanced Technology than elsewhere (Table II). This must be because they do not carry out work in many of the subjects where the proportion of part-time teaching is very high (e.g. women's subjects), and because they have a lower proportion of evening students than the generality of colleges.

15. If all the full-time teachers whom the colleges estimate they need by 1963–64 are to be found, this presupposes an average increase of 2,330 teachers in each of the next four years. If the estimated demand for 1961–62 is to be met in full, an average annual increase of 2,650 is needed. The difference between these two figures is very largely due to present shortages, since the latter estimate presupposes that these will all be made good within two years, instead of within four years. If present vacancies are ignored the average annual increase needed in 1960–61 and 1961–62 is still larger than that required in 1962–63 and 1963–64 although the difference is then not very great.

16. There are notable differences in the demand for Assistants and for senior staff. Whereas a 48 per cent increase is desired for Assistants, a 69 per cent increase is assumed in the numbers of Lecturers, Senior Lecturers and Principal Lecturers. In the Colleges of Advanced Technology 71 per cent more full-time staff are required. It is not unreasonable that a greater proportionate increase should be desired in the numbers of senior staff compared with the numbers of Assistants:

(*a*) advanced courses are more expensive in staffing than part-time day courses, and more progress has been made towards achieving the targets for additional students set by the 1956 White Paper at the advanced level than at lower levels;

(*b*) the guidance given to authorities by the Burnham Committee since 1956 entails some upgrading of staff;

(*c*) advice given to local education authorities has led and will lead to improved conditions of service, which will tend to lighten the teaching load of senior staff particularly.

17. There are significant differences in the pattern of demand by subjects disclosed in Table III and that made by the colleges in 1956 for the Special

Committee. Although the greatest numerical demand in particular subjects continues to be for teachers of mechanical and electrical engineering and of mathematics, the proportionate increase desired in these subjects is very much the same as the average for all subjects. In 1956 the percentage increase in these subjects was conspicuously higher than the average.

18. In management studies the colleges appear to have assumed a large response to the courses leading to the new Diploma in Management Studies announced in Circular 1/60. The large percentage increase required in advanced and professional commerce subjects undoubtedly assumes the development of day-time courses in response to the McMeeking Report. Other desired increases which are specially noteworthy are in physics and women's subjects. The former increase will cause no surprise; we consider that the latter increase may be largely due to a policy of strengthening the full-time staff in a subject where the proportion of work carried out by part-time teachers is at present conspicuously high. We make no comment here on the colleges' estimate for teachers of agricultural subjects. A committee of the National Advisory Council on Education for Industry and Commerce (under the chairmanship of Alderman B. G. Lampard-Vachell) has reviewed the need for teachers of agricultural subjects with the benefit of this information supplied by colleges. That committee's report covers Farm Institutes as well as agricultural education in technical colleges.

19. The only note of caution which we would sound in connection with the college estimates arises from the fact that they assume all vacancies are filled in 1963–64 (cf. paragraphs 10 and 15 above). A proportion of these vacancies are casual and vacancies will never disappear altogether. The present turnover of staff is high and, as a crude adjustment, we are disposed to expect that about a half of the present 1,016 vacancies must remain unfilled. This is not to say that these 500 or so teachers are not badly needed, but rather that (whatever the authorised establishment fixed for colleges) we think it reasonable to assume that some 2·5 per cent of posts in the establishment will always be vacant, because of staff turnover.

(B) OUR OWN CALCULATION OF NEED IN 1963–64

20. We have ourselves attempted to estimate the number of full-time teachers who will be needed in 1963–64. Our estimates are obtained by predicting the numbers of students in the various categories likely to be in attendance and converting them to "full-time equivalent" students. A staffing ratio can be obtained by dividing the present number of "full-time equivalent" students by the present number of "full-time equivalent" teachers and making certain assumptions about the future effect of staffing policies now operating. With this ratio, an estimate of the number of "full-time equivalent" teachers in 1963–64 can be made. Finally, the resulting demand for teachers must be scaled down (to allow for the use of part-time staff), in order to reach an estimate of actual full-time teachers required.

21. In a field where the majority of students attend voluntarily the margin of error in predicting future numbers is considerable. It is difficult to fix an appropriate ratio of staff to students, bearing in mind the diversity of courses, and it is difficult to make a precise estimate of the contribution to teaching which can be made by part-time staff, when the proportion of the colleges' work carried out in the day-time is increasing. For all these reasons we take care to set out the assumptions on which our calculations are based.

22. Appendix B states the main assumptions and summarises the results of our calculations. Our method of procedure is explained more fully in the paragraphs below.

*Estimated numbers of students**

Full-time students (including "sandwich" students)

23. In recent years numbers have risen as follows:

	1954–55	1955–56	1956–57	1957–58	1958–59	1959–60† (to 1st March)
1. Students of 15–17	29,500	32,000	35,000	40,000	48,500	57,500
2. All other students	25,000	26,500	31,500	39,500	52,000	51,000
3. Line 1 as % of total 15–17 year-olds	1·7	1·9	2·1	2·4	2·7	3·0
4. Line 2 as % of 18–25 year-olds‡	0·77	0·82	0·97	1·22	1·58	1·59

24. For the 15–17 age groups we assume that the percentage of the age groups receiving full-time further education will continue to grow at 0·3 per cent per annum in spite of the fact that age groups are increasing. We feel that these assumptions are consistent with the development of full-time preliminary courses in technical colleges and of integrated courses of education and training covering the initial period of apprenticeship. We thus assume a total of 98,000 students in these age groups in 1963–64, or an average annual rise of nearly 10,000 from 1958–59 onwards.

25. For the older full-time students we have attempted to relate the increase in numbers in recent years to the size of the population in the 18–25 age groups.‡ This discloses an average annual increase of 0·2 per cent in the proportion receiving full-time further education. We have assumed that such an annual increase of 0·2 per cent will continue up to 1963–64. While the relationship between the numbers of students receiving full-time further education and the size of the relevant age groups is only one of the factors to be borne in mind, we are very conscious of the large number of new sandwich courses, which at present have not attained their full loading in the final years. We thus assumed a total of 91,000 full-time students in these age groups in 1963–64, or an average annual rise of 8,000 from 1958–59 onwards.

26. Our total estimate of full-time students in all age groups in 1963–64 is thus 189,000, which presupposes that numbers will grow by an annual average of nearly 18,000 from 1958–59 onwards. It is worth noting that a higher increase was in fact achieved between the years 1957–58 and 1958–59.

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* In this Paper all estimates of students relate to the category of establishments covered by the colleges' return of teachers, viz. major establishments of further education; excluding art establishments (except in so far as they have work in subjects specifically named in the enquiry), and all students in Farm Institutes.

† Ministry statistics for 1959–60 and later years are collected in a different manner from previous years. Students starting courses after 1st March who would have appeared in previous returns are now omitted, and it is possible that some colleges have also omitted other students. For this reason all projections are made from 1958–59 figures.

‡ The numbers in the separate age groups are weighted differently. (See Notes to Appendix B.)

Part-time day students

27. Numbers have increased in recent years as follows:

	1954–55	1955–56	1956–57	1957–58	1958–59	1959–60†§ (to 1st March)
1. Students of 15–17	220,500	229,500	238,500	236, 000	236,000	244,500
2. All other students	173,500	194,500	220,000	238,500	244,500	243,000
3. Line 1 as % of total 15–17 year-olds	12·9	13·6	14·4	14·0	13·3	12·7
4. Line 2 as % of total 18–25 year-olds‡.	8·3	9·3	10·4	11·3	11·7	11·7

28. The large majority of these students are attending college on one day a week under arrangements for release from their employment. It seems likely that the future pattern of recruitment for training in industry will be more relevant to the numbers of students in the colleges than the size of the age group concerned.

29. We think it unlikely that, in the 15–17 age groups, the very poor showing of the last few years will continue. On the other hand we do not feel able to assume that numbers of students in these age groups will rise by more than 7,000 per annum on average, despite the "bulge". This would give a total of 271,000 students of 15–17 in 1963–64, which would amount to 11·7 per cent of the much enlarged age-groups.

30. For the other part-time day students, we assume that numbers rise by 10,000 per annum up to 1963–64. This would mean a total of 295,000 students. We are thus supposing that numbers in the older age-groups will increase faster than at the lower end, as they have done in the past few years. It is important to bear in mind that an appreciable number even of part-time day students is recruited at about 18 from school, in addition to those promoted from less advanced part-time courses.

31. Our total estimate of part-time day students in 1963–64 is thus 566,000, which presupposes an annual average rise of 17,000 from 1958–59 onwards.

Evening only students

32. Numbers have increased in recent years as follows:

1954–55	1955–56	1956–57	1957–58	1958–59	1959–60† (to 1st March)
628,000	692,000	695,000	692,000	750,000	755,000

Between 1954–55 and 1958–59 the annual average rise is over 30,000. If the large increase between 1954–55 and 1955–56 is ignored, the annual average increase becomes about 19,000. As part-time day-release grows in fields where the present pattern of study is the evening course, it is likely that evening attendance of many vocational students will diminish. On the other hand only some 200,000 evening students in 1959–60 were following vocational courses. The enrolment at non-vocational classes is virtually unpredictable. In this Paper it is assumed that an annual average increase of 25,000 evening only students continues between 1958–59 and 1963–64. The total of evening students in 1963–64 is thus assumed to be 875,000.

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†‡ See footnotes on page 6.

§ Omissions are likely to be less numerous than for full-time students.

Full-time equivalent students

33. In this paper, part-time day students are converted to full-time by dividing their numbers by five. Evening students are converted to full-time by dividing their number by ten. The ratio of 1 : 5 : 10 is readily defensible in terms of the normal organisation of technical college staffing by means of a day consisting of three sessions. An evening attendance would normally count as a whole session in a teacher's timetable, even though often shorter in duration than one of the day-time sessions.

34. We recognise that the above formula is necessarily crude, and masks the fact that different staffing ratios are appropriate for advanced and non-advanced classes, that the proportion of advanced work is probably less in evening classes, and that the overall proportion of advanced work need not remain constant during the period under review.

35. On the basis adopted the following estimates emerge:

Full-time equivalent students

1958–59	1959–60† (to 1st March)	1963–64
271,600	281,500	390,000

† See footnote on page 6.

Staffing Ratio

36. Figures for the full-time equivalent force of teachers in the category of establishments concerned are available only for 1955–56 (Report of Special Committee) and 1959–60 (this year's enquiry to colleges). A reasonable estimate can, however, also be made for 1958–59. The following staffing ratios then emerge:

Full-time equivalent teacher/student ratio

1955–56	1958–59	1959–60* (1)	1959–60* (2)
12·2	10·9	10·1	9·8

Notes: (1) On the basis of the actual number of full-time equivalent teachers.
(2) On the basis of the authorised establishment of full-time equivalent teachers.

* These figures are too low to the extent that the 1959–60 numbers of students are incomplete.

37. An average annual improvement of over 0·4 per cent between 1955–56 and 1958–59 is thus revealed. The choice of a staffing ratio for the future is difficult. That of 1 : 9·8 is obviously to be preferred to that of 1 : 10·1, but it cannot be assumed that the authorised establishment of all colleges accurately reflects their full needs: because of continuous difficulties in filling establishments, the establishment itself may sometimes be fixed at a lower figure than the ideal. The growth of advanced classes and the trend towards improved conditions of service for staff are likely to continue, although the rate of improvement must gradually slow down. On the other hand, as the number of students rises, so it should become increasingly less necessary to run very small classes. Taking all this into account, we think that it is reasonable to adopt a ratio of 1 : 9·5 as a basis for long-term calculations.

38. If we assume that such a ratio can be attained as early as 1963–64, we estimate that in 1963–64 there will be a need for the full-time equivalent of 41,000 staff; if we assume, with the colleges, that full-time teachers will carry out 69 per cent of the work at that date, the resulting demand for full-time teachers in 1963–64 is 28,300.

(C) RECONCILIATION OF OUR ESTIMATE WITH THAT MADE BY THE COLLEGES

39. The colleges' estimate of full-time teachers needed in 1963–64 is 27,235 (see paragraph 13). Our own estimate is 28,300. We suggested in paragraph 19 that there was a case for scaling down the college estimate on the basis that a proportion of vacancies would always remain unfilled. If we reduce the estimate by 2·5 per cent as there suggested, the resulting figure is about 26,500. But similar considerations would lead us to scale down our own estimate from 28,300 to about 27,600.

40. We think there is a case for our adopting the figure of 27,600 rather than that of 26,500: it is quite likely that the colleges were unable to take full account of the increase in the size of the age groups four years ahead. But the difference between the two figures is small and, taking account of the margin of error inherent in these estimates, we have agreed on a final estimate of 27,000 full-time teachers* needed in 1963–64.

THE LONG TERM NEED FOR FULL-TIME STAFF

41. We have also projected our calculations to estimate the number of full-time teachers needed in 1969–70. In view of Government pronouncements we have not felt it necessary to take into account by that date either the compulsory raising of the school-leaving age or compulsory County College attendance. Certain new developments are, nevertheless, under consideration in further education, notably as a result of the Crowther Report ("15 to 18"). We mention these more specifically in paragraphs 57 and 58 below. But we have not at this stage felt able to quantify the effect which they would have on the demand for teachers, and the estimates we make below rest on the broad assumption that current trends and current policies continue to 1969–70.

Estimated numbers of students (see Appendix B)

42. *Full-time and sandwich students.* For students of 15–17 we assume that the proportion of the age groups receiving full-time education continues to grow at 0·3 per cent per annum. The age groups are much smaller by 1969–70 and the resulting estimate of students in college is 117,000. For older students, we think that the annual increase of 0·2 per cent in the proportion of the 18–25 age groups receiving full-time further education will slow down: there are signs that the number of new courses started each year is now beginning to decrease. We have assumed an annual increase of 0·15 per cent in the proportion of the age groups in college; with these older students, however, the effect of the bulge is still very apparent in 1969–70, and the resulting estimate of the number of such students in college is 140,000.

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* It is worth noting that this represents a staffing ratio of 1 : 9·9. In other words we are saying that the ratio of 1 : 9·5 mentioned in paragraph 37 will not be achieved in 1963–64, after allowing for unfilled vacancies at the time.

43. Put another way, we are assuming that the numbers of full-time students of 15–17 increase annually by under 4,000 between 1963–64 and 1969–70, compared with an average of 9,500 in the earlier period. For the other students, we are assuming that an average increase of about 8,000 per annum continues from 1958–59 right through to 1969–70. The total of all full-time students in 1969–70 would be 257,000.

44. *Part-time day students.* We assumed that the numbers of students of 15–17 would rise by an annual average of 7,000 up to 1963–64. If this rise continued to 1969–70 the number of students in these age-groups would be 313,000. As the total population in these age-groups will have fallen considerably between 1963–64 and 1969–70, the proportion receiving part-time day education would amount to 16·1 per cent. We are thus assuming that the ground lost in the earlier years of the decade will have been more than regained at the end of the period. We assumed that the numbers of students in all other age groups would rise by an annual average of 10,000 up to 1963–64. If this rise continued up to 1969–70 the number of students in this category would be 355,000. Adopting these hypotheses we estimate that the total number of part-time day students (all age groups) will reach 668,000 in 1969–70.

45. *Evening only students.* In default of a better hypothesis we assume that an average rise in numbers of 25,000 per annum continues, giving a total of 1,025,000 students in 1969–70.

46. From these estimates we reach an assumed total of 493,000 full-time equivalent students in 1969–70. At a staffing ratio of 1 : 9·5 (see paragraph 37) this represents a need for 51,900 full-time equivalent teachers.

47. *Proportion of work carried out by full-time staff.* The proportion is estimated to rise by about 1 per cent per annum between 1959–60 and 1963–64; we hope that such a rise will continue. The vast majority of the part-time staff employed in further education are employed in the evening, and part-time assistance cannot be so readily obtained in the day. The proportion of day-time work in the colleges is likely to continue to grow. For this reason we assume that full-time staff will carry out 75 per cent of the work by 1969–70.

48. We thus arrive at an estimated demand for full-time staff of 38,900 in 1969–70. This must be scaled down, in the same way that our estimate of 28,300 for 1963–64 was finally reduced to 27,000. After this adjustment, the resulting demand is for **37,200** full-time teachers in 1969–70.

THE NEED FOR QUALIFIED SCIENTISTS AND TECHNOLOGISTS

49. Because of the key place which scientific manpower occupies in our national economy, the Ministry have asked us to estimate the demand for qualified scientists and technologists which the technical colleges will make in 1963–64 and 1969–70. Our estimates relate to university graduates in mathematics and science, to university graduates in technology and to those holding qualifications in technological subjects which are reckoned equivalent to degrees (in this category we include the Diploma in Technology).

50. Appendix C contains the calculations on which our estimates are based. The method may be summarised as follows:

(*a*) We obtained from lines 1–4 of Table III (Appendix A) the total number of full-time teachers engaged in teaching mathematics and natural sciences in 1959–60 (3,649). We estimate that the number of mathematics and science graduates in 1959–60 was 3,470. Thus 95·1 per cent of mathematics and science teachers were graduates.

(*b*) We obtained from lines 5–14 of Table III the total number of full-time teachers engaged in teaching technological subjects in 1959–60 (6,183). We estimate that in 1959–60 the number of technology graduates was 1,850, and the number of those holding qualifications equivalent to degrees in technological subjects was 1,550. Thus 29.9 per cent of those teaching technological subjects were graduates and 25·1 per cent were graduate-equivalents.

(*c*) We assume that in 1963–64 95·1 per cent of mathematics and science teachers will be graduates and, of those teaching technological subjects, 29·9 per cent will be graduates and 27·1 per cent will be graduate-equivalents. Thus, in the first two categories, we assume that the percentage remains as at present. In the last category we assume that the percentage will increase by 0·5 per cent per annum. (See paragraph 51.)

(*d*) We apply the percentages mentioned in (*c*) to the totals of mathematics, science and technology teachers which the colleges estimate they will need in 1963–64. We thus get an estimated need in 1963–64 of 5,410 mathematics and science graduates, 2,795 technology graduates and 2,535 graduate-equivalents in technological subjects.

(*e*) The estimates in (*d*) are multiplied by $\frac{27{,}000}{27{,}235}$ in order to allow for the slight reduction of the overall college estimates for 1963–64 which we applied in paragraph 40. We thus get a revised estimate for 1963–64 of 5,370 mathematics and science graduates, 2,780 technology graduates and 2,510 graduate equivalents in technological subjects.

(*f*) If the total of qualified scientists and technologists in 1959–60 and the total assumed for 1963–64 are expressed as a percentage of the total number of full-time teachers in all subjects on these dates, we find that the proportion of mathematics and science graduates has increased from 19·4 to 19·9 per cent; the proportion of technology graduates has remained constant at 10·3 per cent; and the proportion of graduate-equivalents has increased from 8·7 to 9·3 per cent. We project these assumed trends forward to 1969–70, and assume that of the total force of full-time teachers at that date 20·6 per cent will be mathematics and science graduates, 10·3 per cent will be technology graduates and 10·2 per cent will be graduate equivalents.

(*g*) Our estimate of the total force of full-time teachers needed in 1969–70 is 37,200 (paragraph 48). We thus estimate that there will be a need for 7,660 mathematics and science graduates, 3,830 technology graduates and 3,790 graduate-equivalents in technological subjects in 1969–70.

51. A word of explanation is needed on the assumption made at (*c*) above. In general we feel that it would not be justifiable, at a time when scientists and technologists are in short supply, to assume that a higher proportion of the work of teaching will be carried out by fully qualified men and women than at present. We know that the proportion has remained fairly constant in recent years. Nevertheless, we feel we should make some allowance for the output of men holding the Diploma in Technology, because this source of supply is only just beginning. For this reason we have assumed that the proportion of teachers of technological subjects who hold qualifications reckoned equivalent to degrees will rise by an average of 0·5 per cent per annum.

52. The results of our calculations may be summarised as follows:

Estimated need for scientists and technologists

	1959–60	1963–64	1969–70
1. Mathematics and Science Graduates	3,470	5,370	7,660
2. Technology graduates	1,850	2,780	3,830
3. Graduate-equivalents (technological subjects)	1,550	2,510	3,790
4. Total Scientists and technologists	6,870	10,660	15,280

ANNUAL NET INCREASE AND ANNUAL GROSS RECRUITMENT NEEDED

53. We tabulate below the average annual net increase required in the number of full-time teachers to achieve the totals of 27,000 in 1963–64 and 37,200 in 1969–70 which we estimated were needed in paragraphs 40 and 48 respectively. We show separately the rate of increase needed annually in the numbers of scientists and technologists to achieve the totals set out in paragraph 52.

54. We also set out the gross annual rate of recruitment of new teachers which we consider will be needed to achieve these aims, after allowance has been made for wastage. The Special Committee assumed that 6 per cent of teachers in service at the beginning of each year would leave the colleges during the year. Ministry of Education statistics give a wastage rate of this order in each of the years 1956–57, 1957–58 and 1958–59 and we have therefore ourselves adopted this figure in our calculations over the next decade. The result must not be taken as having a great degree of accuracy, since there can be no certainty that the large numbers of extra teachers recruited in the coming years will leave at the same rate as their colleagues in the past. One factor of obvious importance is the ease or difficulty of getting alternative employment in industry or elsewhere. Moreover, in default of better information, we apply the average rate of 6 per cent to particular categories of teacher (such as the science or technology graduate) although in practice there may be some difference in the wastage rate of teachers of different subjects or of different levels within a subject, just as there are differences in the wastage rates of men teachers and women teachers.

	Year ended March, 1960*		Approximate annual average need:			
			1959–60 to 1963–64		1963–64 to 1969–70	
	Net Increase	Gross Recruitment	Net Increase	Gross Recruitment	Net Increase	Gross Recruitment
1. All full-time teachers . .	1,880	2,840	2,300	3,600	1,700	3,600
2. Maths. and Science graduates .	400	580	480	740	380	770
3. Technology graduates . .	200	300	230	370	180	370
4. Technologists holding qualifications equivalent to degrees .	150	230	240	360	210	400

* Estimate of actual increase.

55. The salient fact which emerges from this table is that throughout the decade there will be no decline in the required rate of staff recruitment. Although the total of full-time teachers in post will not need to increase so fast in the second half of the decade as in the period up to 1963–64, this is fully offset by the assumed increase in the wastage from the enlarged body of teachers.

56. Our enquiries have revealed that in 1958–59 some 160 graduates of mathematics, science or technology transferred to further education from teaching service in schools. As against this, perhaps seventy teachers holding degrees of these kinds transferred in the reverse direction. While it would be disastrous for the schools if the technical colleges recruited their mathematics and science graduates substantially at the schools' expense, a certain amount of movement in both directions is a healthy sign. Nevertheless we think it right to draw attention to the facts of the situation.

57. In paragraph 41 we pointed out that we had made no allowance for the introduction of new trends and policies in framing these estimates. The Government is, however, at the moment exploring the possibility of conferring on young employees the right to claim day-release. If such a right were given it is extremely difficult to forecast its effect, but it might lead to very considerable and rapid growth in the numbers of day-release students.

58. Moreover, the following are among proposals now being considered by the National Advisory Council on Education for Industry and Commerce:

(*a*) the "County College" day of 7½ hours and year of 44 weeks may be gradually adopted;

(*b*) there may be more block-release courses for craft students;

(*c*) sandwich courses may take the place of day-release for students aiming at technician status;

(*d*) full-time induction courses may be introduced for first-year students.

59. If any of these proposals are to be implemented they will require an appreciable addition to the total of 37,200 teachers who it was estimated in paragraph 48 would be needed in 1969–70. If they were all implemented in full the additional demand would be very large indeed. At this stage we have been unable to attempt any precise calculation, but it is clear that our forecasts will need to be kept under continuous review in the light of changing policy and circumstances in further education.

CONCLUSION

60. The highest rate of gross recruitment so far attained is 2,840 teachers in the year ended March, 1960. To achieve an annual average recruitment of 3,600 throughout the 1960s is clearly no mean task. Yet, given the will, we are confident that this can be done. The teacher force has in the past few years grown rapidly and at an ever increasing rate. The plans for university and technical college expansion give promise of a large rise in the supply of trained manpower during the decade. We hope that our estimates will be taken into account in determining both recruitment policy and the provision of training places in the future.

APPENDIX A

TABLE I *All colleges*

Demand for teachers in total and by grades, comparing 1963–64 *with* 1959–60

	(1) 1959–60 (Actual)	(2) 1959–60 (Authorised establishment)	(3) % increase (Col. (2) over Col. (1))	(4) 1961–62	(5) 1963–64	(6) % increase (Col. (5) over Col. (1))
1. Grades A and B	10,887	11,394	4·7%	13,757	16,072	48%
2. L., S.L., P.L.	5,279	5,725	8·5%	7,412	8,884	69%
3. Readers	41	80	95·1%	122	171	317%
4. Heads	1,259	1,283	1·9%	1,446	1,598	27%
5. Principals and Vice-Principals	(450)	(450)	(–)	(480)	(510)	(13%)
6. TOTAL	17,916	18,932	5·6%	23,217	27,235	52%
7. Full-time equivalent of part-time Staff	10,000			11,000	12,000	20%
8. Total of lines 6 and 7	27,916			34,217	39,235	40%
9. Line 6 as % of line 8	64%			68%	69%	

TABLE II *Colleges of Advanced Technology only*

Demand for teachers, in total and by grades, comparing 1963–64 *with* 1959–60

	(1) 1959–60 (Actual)	(2) 1959–60 (Authorised)	(3) % increase (Col. (2) over Col. (1))	(4) 1961–62	(5) 1963–64	(6) % increase (Col. (5) over Col. (1))
1. Grades A and B	260	242	–7%	278	305	17%
2. L., S.L., P.L.	1,007	1,172	16·4%	1,543	1,804	79%
3. Readers	41	80	95·1%	122	171	317%
4. Heads	80	88	10%	95	97	21%
5. (Principals and Vice-Principals)	(18)	(18)	(–)	(20)	(22)	22%
6. TOTAL	1,406	1,600	13·8%	2,058	2,399	71%
7. Full-time equivalent of part-time staff	264			320	323	22%
8. Total of lines 6 and 7	1,670			2,378	2,722	63%
9. Line 6 as % of line 8	84%			87%	88%	

TABLE III *All colleges*

Demand for full-time teachers by subjects

	(1) 1959–60 (actual)	(2) Additional Staff needed 1959–60	(3) Col. (2) as % of Col. (1)	(4) Additional Staff required, 1963–64 compared with 1959–60 actual	(5) % increase, 1963–64 over 1959–60 (Col. 4 over Col. 1)
1. Mathematics	1,400	64	5	749	54
2. Physics	832	61	7	522	63
3. Chemistry	939	55	6	517	55
4. Other natural Sciences	478	41	9	251	53
5. Mech. Engineering	2,590	164	6	1,210	47
6. Prod. Engineering	862	44	5	493	57
7. Elec. Engineering	1,471	99	8	861	59
8. Civil Engineering	169	12	7	139	82
9. Aero. Engineering	69	8	11	47	68
10. Naval Architecture	17	2	11	14	82
11. Chemical Engineering	52	7	13	39	75
12. Metallurgy	183	17	9	131	72
13. Other technologies	430	19	4	173	39
14. Mining	340	27	8	64	19
15. Printing	368	4	1	157	43
16. Textiles	154	5	3	47	31
17. Architecture	200	6	3	57	29
18. Building	1,404	24	2	479	34
19. Nautical Subjects	159	17	11	50	31
20. Agriculture	28	1	4	52	186
21. Management Studies	244	34	14	247	101
22. Commercial Subjects	806	45	6	580	72
23. Clerical Arts	1,092	54	5	548	50
24. Food Education	450	19	4	261	58
25. Women's Subjects	589	38	6	426	72
26. Other Subjects	2,140	149	7	1,147	53
TOTALS	17,466	1,016	6	9,259	53
Principals and Vice-Principals	450			60	13
GRAND TOTALS	17,916			9,319	52

TABLE IV—*Summary of Colleges' Returns*

(i) *Colleges of Advanced Technology* (*including colleges which may acquire that status by* 1963–64)

H = Head of Department R = Reader PL = Principal Lecturer SL = Senior Lecturer L = Lecturer A = Assistant A B = Assistant B	(1) 1959–60 (actual)				(2) 1959–60 (authorised)				(3) 1961–62				(4) 1963–64			
	H	R	PL SL & L	A & B	H	R	PL SL & L	A & B	H	R	PL SL & L	A & B	H	R	PL SL & L	A & B
1. MATHEMATICS	9	3	118	26	10	8	132	24	11	11	171	29	11	17	201	31
2. PHYSICS (including Applied Physics)	8	2	99	21	9	7	109	21	11	10	140	27	11	11	160	31
3. CHEMISTRY (including Applied Chemistry)	10	10	137	24	10	12	146	22	10	16	186	28	10	23	217	29
4. OTHER NATURAL SCIENCES (aggregated)	5	2	50	22	6	3	66	13	6	4	79	14	6	9	94	15
5. MECHANICAL ENGINEERING	9	3	152	24	10	10	189	19	10	16	225	30	10	22	255	35
6. PRODUCTION ENGINEERING	2	1	27	6	3	3	34	7	3	6	54	8	4	10	69	9
7. ELECTRICAL ENGINEERING	11	2	115	20	11	9	140	22	10	14	202	27	10	24	233	30
8. CIVIL ENGINEERING	4	3	38	3	4	5	44	3	4	7	60	3	4	9	69	4
9. AERONAUTICAL ENGINEERING	1	2	24	7	3	3	26	7	4	5	35	8	4	7	40	10
10. NAVAL ARCHITECTURE	—	—	1	—	—	—	1	—	—	—	1	—	—	—	3	—
11. CHEMICAL ENGINEERING (including Fuel Technology)	2	1	28	1	2	4	30	1	3	6	39	2	4	7	41	3
12. METALLURGY	3	4	44	6	2	5	51	5	3	7	61	6	4	7	73	9
13. OTHER TECHNOLOGIES (aggregated)	3	2	45	20	3	2	53	16	3	5	60	16	3	5	68	15
14. MINING	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15. PRINTING	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16. TEXTILES	1	2	14	2	1	2	14	2	1	4	22	—	1	4	30	—
17. ARCHITECTURE	1	1	6	2	1	1	6	2	2	1	12	4	2	2	15	5
18. BUILDING	1	—	18	3	1	—	22	3	1	—	25	3	1	1	30	2
19. NAUTICAL SUBJECTS	1	—	6	4	1	—	6	4	1	—	8	4	1	—	8	4
20. AGRICULTURE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21. MANAGEMENT STUDIES	2	1	38	2	3	4	47	2	5	5	71	5	5	6	86	6
22. COMMERCIAL SUBJECTS (advanced or professional only)	1	—	12	4	1	—	13	6	1	1	18	3	1	1	21	6
23. CLERICAL ARTS	—	—	—	2	—	—	—	2	—	—	—	—	—	—	—	—
24. FOOD EDUCATION (including Catering, Bakery)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25. WOMEN'S SUBJECTS (e.g., Needlecraft, Cookery)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26. OTHER SUBJECTS (aggregated)	6	2	35	61	7	2	43	61	6	4	74	61	5	6	91	61
GRAND TOTALS	80	41	1007	260	88	80	1172	242	95	122	1543	278	97	171	1804	305

TABLE V—*Summary of Colleges' Returns*

(ii) *All other colleges*

H = Head of Department PL = Principal Lecturer SL = Senior Lecturer L = Lecturer A = Assistant A B = Assistant B	(1) 1959–60 (actual)			(2) 1959–60 (authorised)			(3) 1961–62			(4) 1963–64		
	H	PL SL & L	A & B	H	PL SL & L	A & B	H	PL SL & L	A & B	H	PL SL & L	A & B
1. MATHEMATICS	68	409	767	67	423	800	71	545	1008	79	648	1162
2. PHYSICS (including Applied Physics)	48	286	368	49	302	396	56	392	497	64	468	609
3. CHEMISTRY (including Applied Chemistry)	66	358	334	67	385	352	73	481	443	80	565	532
4. OTHER NATURAL SCIENCES (aggregated)	25	140	234	26	146	259	27	177	315	28	211	366
5. MECHANICAL ENGINEERING	146	694	1562	149	752	1625	166	940	1910	177	1106	2193
6. PRODUCTION ENGINEERING	38	199	589	40	212	607	44	294	734	47	370	846
7. ELECTRICAL ENGINEERING	101	488	734	102	520	766	109	667	933	120	804	1111
8. CIVIL ENGINEERING	10	98	13	10	101	14	12	133	20	14	168	40
9. AERONAUTICAL ENGINEERING	3	21	11	3	24	11	5	30	14	4	34	17
10. NAVAL ARCHITECTURE	2	6	8	2	7	9	2	9	13	2	10	16
11. CHEMICAL ENGINEERING (including Fuel Technology)	2	13	5	2	15	5	3	22	6	3	27	6
12. METALLURGY	8	93	25	8	103	26	9	128	37	10	157	54
13. OTHER TECHNOLOGIES (aggregated)	20	73	267	20	75	280	22	90	331	25	110	377
14. MINING	27	87	226	29	100	238	29	104	250	29	112	263
15. PRINTING	27	76	265	27	78	267	28	102	306	31	124	370
16. TEXTILES	20	39	76	20	44	76	21	47	84	22	54	90
17. ARCHITECTURE	22	113	55	22	117	57	21	134	61	22	149	62
18. BUILDING	123	211	1048	123	218	1075	134	293	1189	146	362	1341
19. NAUTICAL SUBJECTS	12	45	91	12	45	94	14	56	112	15	62	119
20. AGRICULTURE	4	3	21	4	3	22	5	4	38	6	6	68
21. MANAGEMENT STUDIES	23	130	48	23	144	55	27	206	68	32	261	95
22. COMMERCIAL SUBJECTS (advanced or professional only)	99	271	419	103	295	433	118	435	573	130	542	685
23. CLERICAL ARTS	56	34	1000	57	37	1050	70	54	1280	85	69	1486
24. FOOD EDUCATION (including Catering, Bakery)	41	84	325	42	88	339	53	111	410	61	150	500
25. WOMEN'S SUBJECTS (e.g., Needlecraft, Cookery)	60	50	479	58	53	516	75	83	660	90	105	820
26. OTHER SUBJECTS (aggregated)	128	251	1657	130	266	1780	157	332	2187	179	406	2539
GRAND TOTALS	1179	4272	10627	1195	4553	11152	1351	5869	13479	1501	7080	15767

APPENDIX B

Summary of past trends and assumptions for the future in the growth in student population and the demand for teachers

	Numbers are in thousands							
	1954–55	1955–56	1956–57	1957–58	1958–59	1959–60 (to 1st March only)	1963–64	1969–70
1. POPULATION (at 31st December)								
(*a*) 15–17 years	1,708	1,687	1,654	1,685	1,771	1,930	2,324	1,944
(*b*) 18–25 years (weighted for full-time students)[1]	3,244	3,233	3,240	3,243	3,229	3,217	3,481	4,009
(*c*) 18–25 years (weighted for part-time day students)[1]	2,094	2,093	2,109	2,116	2,096	2,074	2,317	2,555
2. PERCENTAGE OF 15–17 YEAR-OLDS AT SCHOOL	19·9	20·6	21·5	22·4	23·9	25·0	28·6	35·8
3. FURTHER EDUCATION STUDENTS:[3]								
(i) *Full-time and sandwich students*								
(*a*) 15–17 years	29·5	32	35	40	48·5	57·5	98	117
(*b*) All other ages	25	26·5	31·5	39·5	52	51	91	140
(*c*) TOTAL	54·5	58·5	66·5	79·5	100·5	108·5	189	257
Line (*a*) as a percentage of population 15–17 (1(*a*) above)	1·7	1·9	2·1	2·4	2·7	3·0	4·2	6·0
Line (*b*) as a percentage of population 18–25 (1(*b*) above)	0·77	0·82	0·97	1·22	1·58	1·59	2·6	3·5
(ii) *Part-time day students*								
(*a*) 15–17 years	220·5	229·5	238·5	236	236	244·5	271	313
(*b*) All other ages	173·5	194·5	220	238·5	244·5	243	295	355
(*c*) TOTAL	394	424	458·5	474·5	480·5	487·5	566	668
Line (*a*) as a percentage of population 15–17 (1(*a*) above)	12·9	13·6	14·4	14·0	13·3	12·7	11·7	16·1
Line (*b*) as a percentage of population 18–25 (1(*c*) above)	8·3	9·3	10·4	11·3	11·7	11·7	12·7	13·9
(iii) *Evening only students*	628	692	695	692	750	755	875	1,025
(iv) *Full-time equivalent students*[4]	196·1	212·5	227·7	234·6	271·6	281·5	390	493
4. FURTHER EDUCATION TEACHERS								
(*a*) *Full-time teachers*		11·5				17·9	28·3	38·9
(*b*) *Part-time teachers expressed as full-time equivalent*		6·0				10·0	12·7	13·0
(*c*) *Total full-time equivalent teachers*		17·5				27·9	41·0	51·9
Percentage of (*a*) to (*c*)		65·6				64·2	69	75
5. FULL-TIME EQUIVALENT STUDENTS PER FULL-TIME EQUIVALENT TEACHER ("Staffing ratio")		12·2				10·1[2]	9·5	9·5

For footnotes *see* page 20.

FOOTNOTES

[1] The numbers in the different ages have been weighted in the following way:

Age	*Weights for full-time and sandwich students*	*Weights for part-time day students*
18	1	1
19	0·94	0·86
20	0·87	0·63
21	0·79	0·46
22	0·70	0·32
23	0·59	0·21
24	0·48	0·14
25	0·35	0·09

[2] This figure is too low to the extent that the return of numbers of students is incomplete.

[3] Students in all major establishments of further education, excluding students in art establishments (other than in subjects specifically named in the enquiry to colleges (see Appendix A, Table III) and students in Farm Institutes.

[4] Full-time, part-time day and evening only students are multiplied by 1, 0·2 and 0·1 respectively.

BASIS OF PROJECTION TO 1963–64 AND 1969–70

Population. Government Actuary's projection.

15–17 *year-olds at school.* Projection made for Crowther Committee (no change in compulsory school-leaving age).

Full-time and sandwich students

15–17. Percentage of 15–17 year-olds increases at 0·3 per cent per annum from 1958—1959.

All others. Percentage of 18–25 year-olds (weighted for full-time students) increases at 0·2 per cent per annum from 1958–59 to 1963–64 and then at 0·15 per cent per annum.

Part-time day students

15–17. Numbers increase by 7,000 a year from 1958–1959.

All others. Numbers increase by 10,000 a year from 1958–1959.

Evening only students

Numbers increase by 25,000 a year from 1958–1959.

Teaching staff. Equivalent full-time student/equivalent full-time teacher ratio of 9·5 in both 1963–64 and 1969–70, and full-time staff accounting for 69 and 75 per cent of teaching in the respective years.

Wastage. 6 per cent per annum.

Calculation of demand for scientists and technologists
in 1963–64 *and* 1969–70

	1959–60	1963–64	1969–70
Full-time Teachers (college returns)			
a. Maths. and Natural Sciences (Table III, lines 1–4)	3,649	5,688	
b. Engineering and Technology (Table III, lines 5–14)	6,183	9,352	
c. Total (all subjects)	17,916	27,235	
Scientists and Technologists			
d. Maths. and Science graduates	3,470	5,410	
e. Technology graduates	1,850	2,795	
f. Graduate equivalents in Technology	1,550	2,535	
g. Percentage d/a	95·1	95·1	
h. Percentage e/b	29·9	29·9	
j. Percentage f/b	25·1	27·1	
k. Percentage d/c	19·4	19·9	20·6
l. Percentage e/c	10·3	10·3	10·3
m. Percentage f/c	8·7	9·3	10·2
Scientists and Engineers related to our own Estimates of total full-time teachers			
n. Total full-time teachers (our estimate)	17,916	27,000	37,200
p. Maths. and Science graduates	3,470	5,370	7,660
q. Technology graduates	1,850	2,780	3,830
r. Graduate equivalents in Technology	1,550	2,510	3,790
s. Total Scientists and Engineers	6,870	10,660	15,280

Sources : a–c College returns.
d–f (1959–60): Ministry estimates (based on 1958–59 records).
d–f (1963–64): Percentages g, h, j, applied to a, b, b respectively.
g–h (1963–64): Same as corresponding percentages in 1959–60.
j (1963–64): 1959–60 percentage increased by 0·5 per cent per annum.
k–m (1969–70): 1963–64 percentages projected forward on basis of rate of annual increase between 1959–60 and 1963–64.
n: Sub-committee's estimates.
p: k × n
q: l × n
r: m × n
s: p + q + r

Printed in England by The Campfield Press, St. Albans,
under the Authority of Her Majesty's Stationery Office